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used conductor is copper. *Compare* insulator, semiconductor.

Conference on Data Systems Languages See CODASYL.

CONFIG.SYS A special text file that controls certain aspects of operating-system behavior in MS-DOS and OS/2. Commands in the CONFIG.SYS file enable or disable system features, set limits on resources (for example, the maximum number of open files), and extend the operating system by loading device drivers that control hardware specific to an individual computer system.

configuration In reference to a single microcomputer, the sum of a system's internal and external components, including memory, disk drives, keyboard, video, and (generally) less critical add-on hardware such as a mouse, modem, or printer. The configuration of a computer system affects the way it works and the way it is used. Software (the operating system and various device drivers), the user's choices established through configuration files such as the AUTOEXEC.BAT and CONFIG.SYS files on IBM PCs and compatibles, and sometimes hardware (switches and jumpers) are needed to "configure the configuration" to work correctly. Although system configuration can be changed, as by adding more memory or disk capacity, the basic structure of the system—its architecture—remains the same. *See also* AUTOEXEC.BAT, CONFIG.SYS.

In relation to networks, the entire interconnected set of hardware, or the way in which a network is laid out—the manner in which elements are connected.

connect charge The amount of money a user must pay for connecting to a commercial communications system or service. Some services calculate the connect charge as a flat rate based solely on time increments; others charge a varying rate based on the type of service or the amount of information being accessed. *See also* connect time.

connector In hardware, a coupler used to join cables or to join a cable to a device—for example, an RS-232-C connector used to join a modem cable to a computer. Most connector types are available in one of two genders—male or female. A male

connector is characterized by one or more exposed pins; a female connector is characterized by one or more receptacles designed to accept the pins on the male connector. *See also* DB connector, DIN connector.

In programming, a circular symbol used in a flowchart to indicate a break, as to another page.

connect time The amount of time during which a computer user is actively connected to a remote computer. On commercial systems, the connect time is one means of calculating how much money the user must pay for using the system. *See also* connect charge.

consistency check A survey to determine that items of data conform to certain formats, bounds, and other parameters, and are not internally contradictory. *Compare* completeness check.

console Traditionally, a control unit such as a terminal, through which a user communicates with a computer. In microcomputers, the console is the cabinet that houses the main components and controls of the system, sometimes including the screen, the keyboard, or both. To the MS-DOS operating system, the console is the primary input (keyboard) and primary output (screen) device, as evidenced by the device name CON. *See also* system console.

constant A named item that retains a constant value throughout the execution of a program, as opposed to a variable, which can have its value changed during execution. *Compare* variable.

constant expression An expression composed only of constants; hence, an expression whose value does not change during program execution. *Compare* variable expression.

constellation In communications, a pattern representing the possible states of a carrier wave, each of which is associated with a particular bit combination. A constellation shows the number of states that can be recognized as unique changes in a communications signal and thus the maximum number of bits that can be encoded in a single change (equivalent to 1 baud, or one event). The diagram shows a 16-point constellation of the type used in quadrature amplitude modulation.

constraint In programming, a limit set on the solu-

nontrivial



normalize

transmission, a method of encoding data in which the signal representing binary digits alternates between positive and negative voltage when there is a change in digits from 1 to 0 or vice versa. In other words, the signal does not return to a zero, or neutral, level after transmission of each bit; timing is used to distinguish one bit from the next, as when a succession of 1's is transmitted.

In the recording of data on a magnetic surface, NRZ refers to a similar method in which one magnetic state represents a 1 and, usually, the opposite state represents a 0; as in communications, there is no "neutral" state that is used as a reference condition. *Compare* return to zero.

nontrivial A term describing something that is either difficult or particularly meaningful—for example, a complicated programmed procedure to handle a difficult problem would represent a nontrivial solution.

nonvolatile memory A storage system that does not lose data when power is removed from it. Intended to refer to core, ROM, EPROM, bubble memory, or battery-backed CMOS RAM, the term is occasionally used in reference to disk subsystems as well. *See also* bubble memory, CMOS RAM, core, EPROM, ROM.

NO-OP *See* no-operation instruction.

no-operation instruction Abbreviated NOP or NO-OP; both pronounced "no-opp." A machine instruction that has no results other than to cause the processor to use up a cycle or two of clock time. NOPs are useful in certain situations, such as disabling a call to a subroutine (by replacing the call instruction with a NOP), padding out timing loops, or forcing subsequent instructions to align on certain memory boundaries. *See also* machine instruction.

NOP *See* no-operation instruction.

normal distribution In statistics, a type of function that describes the probabilities of the possible values of a random variable. The function, whose graph is the familiar bell-shaped curve, can be used to determine the probability that the value of the variable will fall within a particular interval of values.

normal form In a relational database, an approach

to structuring information. Normal forms avoid redundancy and inconsistency and promote efficient maintenance, storage, and updating of information. Several types of normalization are accepted, each a refinement of the preceding one. Of these, three forms are commonly used: first normal (1NF), second normal (2NF), and third normal (3NF). First normal forms, the least structured, are groups of records (such as employee lists) in which each field (column) contains unique and nonrepeating information. Second and third normal forms break down first normal forms, separating them into different tables by defining successively finer interrelationships between fields. Second normal forms do not include fields that are subsets of other fields rather than of the primary (key) field; for example, a second normal form keyed to employee name would not include both job grade and hourly rate if pay were dependent on job grade. Third normal forms do not include fields that provide information about fields other than the key field; for example, a third normal form keyed to employee name would not include project name, crew number, and supervisor unless the crew number and supervisor were assigned only to the project on which the employee is working. Further normalization refinements include Boyce-Codd Normal Form (BCNF), fourth normal form (4NF), and projection-join (or fifth) normal form (PJ/NF or 5NF).

In programming, the metalanguage sometimes called the Backus normal form (Backus-Naur form) is a language used for describing the syntax of other languages—specifically ALGOL 60, for which it was invented. *See also* Backus-Naur form.

normal hyphen *See* hyphen.

normalize In programming, to adjust the fixed-point and exponent portions of a floating-point number to bring the fixed-point portions into a specified range.

In database management, to apply a body of techniques to a relational database in order to minimize the inclusion of duplicate information. Normalization greatly simplifies query and update management, including security and integrity considerations. However, because normalization necessarily involves a technique called projection,